CLAIMS

WHAT IS CLAIMED:

1. An apparatus, comprising:

a chamber adapted to receive a first precursor gas;

at least one surface interior to the chamber; and

an acoustic wave driver coupled to the at least one surface and adapted to drive acoustic waves along the interior surface.

2. The apparatus of claim 1, wherein the acoustic wave driver is adapted to drive the surface acoustic wave in a selected range of frequencies.

3. The apparatus of claim 2, wherein the range of frequencies is selected based upon the composition of the first precursor gas.

4. The apparatus of claim 3, wherein the range of frequencies is selected based upon a mass of the molecules in the first precursor gas.

5. The apparatus of claim 4, wherein the range of frequencies has a midpoint frequency, and wherein the midpoint frequency is decreased when the mass of the molecules in the first precursor gas is increased.

6. The apparatus of claim 4, wherein the range of frequencies has a midpoint frequency, and wherein the midpoint frequency is increased when the mass of the molecules in the first precursor gas is decreased.

7. The apparatus of claim 2, wherein the selected range of frequencies is chosen from an overall range of about 100Hz to about 200 kHz.

8. The apparatus of claim 1, wherein the acoustic wave driver comprises at least one pair of electrodes.

9. The apparatus of claim 8, wherein the pair of electrodes is a pair of apodized electrodes.

10. The apparatus of claim 1, wherein the acoustic wave driver comprises at least one transducer.

11. The apparatus of claim 1, wherein the at least one surface comprises a surface of a piezoelectric liner deployed in the chamber.

12. The apparatus of claim 11, wherein the piezoelectric liner is a quartz liner.

13. The apparatus of claim 11, wherein the at least one surface comprises a plurality of piezoelectric liners.

14. The apparatus of claim 1, wherein the at least one surface comprises an interior surface of the chamber.

15. The apparatus of claim 1, further comprising a pump coupled to the chamber and operable to evacuate the first precursor gas from the chamber.

16. The apparatus of claim 1, wherein the chamber is adapted to receive a second precursor gas.

17. A method, comprising:

providing a surface acoustic wave to at least one surface in a chamber;

providing a first precursor gas to the chamber concurrent with providing the surface acoustic wave; and

removing a portion of the first precursor gas from the chamber.

18. The method of claim 17, wherein providing the surface acoustic wave comprises providing a first and second AC signal to a first and second electrode, respectively, and wherein the first and second AC signals have opposite polarities.

19. The method of claim 17, wherein providing the surface acoustic wave comprises:

selecting a range of frequencies; and

providing the surface acoustic wave having the selected range of frequencies.

20. The method of claim 19, wherein selecting the range of frequencies comprises selecting the range of frequencies based upon the composition of the first precursor gas.

21. The method of claim 20, selecting the range of frequencies comprises selecting the range of frequencies based upon a mass of the molecules in the first precursor gas.

22. The method of claim 21, wherein selecting the range of frequencies comprises selecting a midpoint frequency in the range of frequencies, and further comprising decreasing the selected midpoint frequency when the mass of the molecules in the first precursor gas is increased.

23. The method of claim 21, wherein selecting the range of frequencies comprises selecting a midpoint frequency in the range of frequencies, and further comprising increasing the selected midpoint frequency when the mass of the molecules in the first precursor gas is decreased.

24. The method of claim 19, wherein selecting the range of frequencies comprises selecting frequencies ranging from about 100Hz to about 200 kHz.

25. The method of claim 17, wherein providing the first precursor gas comprises opening a valve coupled to the chamber.

26. The method of claim 25, wherein removing the portion of the first precursor gas comprises removing the portion of the first precursor gas using a pump.

27. The method of claim 17, wherein removing the portion of the first precursor gas from the chamber comprises removing the portion of the first precursor gas from the chamber concurrent with providing the surface acoustic wave.

28. The method of claim 17, further comprising providing a second precursor gas to the chamber after removing the portion of the precursor gas from the chamber.

29. An apparatus, comprising:

means for providing a surface acoustic wave to at least one surface in a chamber;

means for providing a first precursor gas to the chamber; and

means for removing a portion of the first precursor gas from the chamber.

30. The apparatus of claim 29, wherein the means for providing the surface acoustic wave comprises means for providing the surface acoustic wave having the selected range of frequencies.

31. The apparatus of claim 29, wherein the means for providing the first precursor gas comprises a valve coupled to the chamber.

32. The apparatus of claim 29, wherein the means for removing the portion of the first precursor gas comprises a pump.

33. The apparatus of claim 29, wherein the means for removing the portion of the first precursor gas is a purge gas.

34. The apparatus of claim 29, further comprising means for introducing a purge gas into the chamber to remove at least a portion of the first precursor gas.

35. The apparatus of claim 29, further comprising means for introducing a second precursor gas into the chamber after removing at least a portion of the first precursor gas.

36. A processing chamber for performing an atomic layer deposition process, comprising:

a chamber having at lest one inlet through which a first precursor gas and a purge gas may be introduced into the chamber; and

an acoustic wave driver coupled to a surface interior to the chamber, the acoustic wave driver being operable to generate a surface acoustic wave along the surface.

37. The processing chamber of claim 36, wherein the acoustic wave driver is adapted to drive the surface acoustic wave in a selected range of frequencies.

38. The processing chamber of claim 37, wherein the range of frequencies is selected based upon the composition of the first precursor gas.

39. The processing chamber of claim 38, wherein the range of frequencies is selected based upon a mass of the molecules in the first precursor gas.

40. The processing chamber of claim 39, wherein the range of frequencies has a midpoint frequency, and wherein the midpoint frequency is decreased when the mass of the molecules in the first precursor gas is increased.

41. The processing chamber of claim 39, wherein the range of frequencies has a midpoint frequency, and wherein the midpoint frequency is increased when the mass of the molecules in the first precursor gas is decreased.

42. The processing chamber of claim 37, wherein the selected range of frequencies is chosen from an overall range of about 100Hz to about 200 kHz.

43. The processing chamber of claim 36, wherein the acoustic wave driver comprises at least one pair of electrodes.

44. The processing chamber of claim 43, wherein the pair of electrodes is a pair of apodized electrodes.

45. The processing chamber of claim 36, wherein the acoustic wave driver comprises at least one transducer.

46. The processing chamber of claim 36, wherein the at least one surface comprises a surface of a piezoelectric liner deployed in the chamber.

47. The processing chamber of claim 46, wherein the piezoelectric liner is a quartz liner.

48. The processing chamber of claim 46, wherein the at least one surface comprises a plurality of piezoelectric liners.

49. The processing chamber of claim 36, wherein the at least one surface comprises an interior surface of the chamber.

50. The processing chamber of claim 36, further comprising a pump coupled to the chamber and operable to evacuate the first precursor gas from the chamber through an exhaust foreline.

51. The processing chamber of claim 50, wherein at least a portion of the at least one surface is within at least a portion of the exhaust foreline.

52. The processing chamber of claim 36, wherein a second precursor gas may be introduced into the chamber through the at least one inlet.

53. The processing chamber of claim 52, wherein the at least one inlet comprises first, second, and third inlets through which the first precursor gas, the purge gas, and the second precursor gas, respectively, may be introduced into the chamber.

54. The processing chamber of claim 36, wherein the at least one inlet comprises a first inlet through which the first precursor gas may be introduced into the chamber and a second inlet through which the purge gas may be introduced into the chamber.

55. A method for performing an atomic layer deposition process, comprising:

introducing a workpiece in a chamber;

providing a surface acoustic wave to at least one interior surface in the chamber; and

introducing a first precursor gas into the chamber.

56. The method of claim 55, further comprising removing at least a portion of the first precursor gas.

57. The method of claim 56, wherein removing the portion of the first precursor gas comprises removing the portion of the first precursor gas using a pump.

58. The method of claim 56, further comprising introducing a purge gas into the chamber to remove at least a portion of the first precursor gas.

59. The method of claim 56, further comprising continuing to provide the surface acoustic wave to the at least one interior surface in the chamber while removing at least a portion of the first precursor gas.

60. The method of claim 56, further comprising introducing a second precursor gas into the chamber after removing at least a portion of the first precursor gas.

61. The method of claim 60, further comprising providing the surface acoustic wave to the at least one interior surface in the chamber while introducing the second precursor gas into the chamber.

62. The method of claim 60, further comprising:

removing at least a portion of the second precursor gas from the chamber; and

re-introducing the first precursor gas into the chamber while providing the surface acoustic wave to the at least one interior surface in the chamber.

63. The method of claim 55, wherein providing the surface acoustic wave comprises providing a first and second AC signal to a first and second electrode, respectively, and wherein the first and second AC signals have opposite polarities.

64. The method of claim 55, wherein providing the surface acoustic wave comprises:

selecting a range of frequencies; and

providing the surface acoustic wave having the selected range of frequencies.

65. The method of claim 64, wherein selecting the range of frequencies comprises selecting the range of frequencies based upon the composition of the first precursor gas.

66. The method of claim 65, selecting the range of frequencies comprises selecting the range of frequencies based upon a mass of the molecules in the first precursor gas.

67. The method of claim 66, wherein selecting the range of frequencies comprises selecting a midpoint frequency in the range of frequencies, and further comprising decreasing the selected midpoint frequency when the mass of the molecules in the first precursor gas is increased.

68. The method of claim 66, wherein selecting the range of frequencies comprises selecting a midpoint frequency in the range of frequencies, and further comprising increasing the selected midpoint frequency when the mass of the molecules in the first precursor gas is decreased.

69. The method of claim 64, wherein selecting the range of frequencies comprises selecting frequencies ranging from about 100Hz to about 200 kHz.